

NON-PUBLIC?: N  
ACCESSION #: 9010240411  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Waterford Steam Electric Station Unit 3 PAGE: 1 OF 04

DOCKET NUMBER: 05000382

TITLE: Reactor Trip Due to Grid Disturbance  
EVENT DATE: 03/29/90 LER #: 90-003-01 REPORT DATE: 10/11/90

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: T. H. Smith, Plant Engineering TELEPHONE: (504) 464-3127  
Superintendent

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

#### ABSTRACT:

At 0730 hours on March 29, 1990, with Waterford Steam Electric Station Unit 3 at 99.9% power, a severe transient on the 230 KV power transmission grid at Taft, Louisiana, resulted in a reactor trip. The transient was initiated when an Occidental Chemical Company employee caused a fault at the 230 KV substation owned by the chemical company. The reactor coolant pumps slowed to less than 96.5 % of normal speed as voltage dropped. This generated a low multiplier in the Core Protection Calculators and a reactor trip occurred due to an anticipatory Departure from Nucleate Boiling Ratio trip signal. This event is reportable as an automatic reactor protection system actuation. This supplement is submitted for potential generic interest with respect to off-site grid conditions.

As a result of this system transient, a degraded voltage condition occurred on the 4.16 KV 'B' safety bus when a 'B' bus tie breaker opened

automatically which de-energized the 'B' safety bus. Emergency Diesel Generator 'B' started and re-energized the 'B' safety bus as designed. The root cause of this event was a grid voltage drop on the Louisiana Power and Light Company 230 KV system caused by a fault at Occidental Chemical Company. Because plant protective features functioned as designed, this event did not threaten the health or safety of the general public or plant personnel.

END OF ABSTRACT

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At 0730 hours on March 29, 1990, with Waterford Steam Electric Station Unit 3 at 99.9% power, a severe transient on the 230 KV power transmission grid at Taft, Louisiana, resulted in a reactor trip. The transient was initiated when an Occidental Chemical Company employee opened an energized 230 KV switch in the substation owned by the chemical company during scheduled maintenance. Opening the switch developed an arc which flashed to ground. The fault was cleared in approximately .5 seconds. The fault, however, burned the shield wire above the switch and the shield wire fell across the 230 KV line. The station was re-energized by automatic reclosing approximately 30 seconds later, placing a three-phase fault on the system. This fault also lasted approximately .5 seconds. Voltage dipped severely throughout the South Louisiana service area.

Both of the above faults were cleared by actuation of the backup protection relays (EIIS Identifier-94) of the industrial loop that supplies power to the chemical company. The faults cleared in approximately .5 seconds vice the expected time of .1 seconds because the primary relay system (EIIS Identifier-94) at the chemical company's substation had been placed out of service because of previous failures of both the transfer trip equipment (EIIS Identifier-83) and the fiber optic cable (EIIS Identifier-CBL).

The grid voltage dropped from 230 KV to about 34 KV for approximately .5 seconds causing the reactor coolant pumps (RCPs) (EIIS Identifier AB-P) to slow to less than 96.5 % of normal speed as sensed by the core protection calculators (CPCs) (EIIS Identifier JC-CPU). The CPCs generated a 0.1 multiplier which adjusted the existing calculated Departure from Nucleate Boiling Ratio (DNBR) of approximately 1.5, to a value significantly less than the low DNBR trip setpoint of 1.26, which initiated a reactor trip. In addition, the steam generator feed pump (SGFP) turbine overspeed trip solenoid (EIIS Identifier SJ-TRB-SSV) opened on undervoltage, dumping governor control oil and causing a SGFP turbine trip. The emergency feed water (EFW) system (EIIS Identifier -

BA) actuated as designed and was used to manually feed the steam generators for approximately one hour and forty-one minutes.

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One of the two bus tie breakers (EIIS Identifier - BKR) from the 4.16 KV 'B' safety bus (EIIS Identifier - EB) to the 'B' non-safety bus opened. Emergency Diesel Generator (EDG) 'B' (EIIS Identifier - EK) started and aligned to 'B' safety train components as designed. The voltage

transient disconnected the steam bypass control system (SBCS) (EIIS Identifier - JI) from the automatic mode; therefore, the SBCS was not immediately available. When the reactor tripped, pressure increased to 1100 psia in both steam generators. Steam generator pressure control and reactor coolant system heat removal was accomplished by the automatic operation of the atmospheric dump valves (EIIS Identifier SB - PCV) and the main steam safety valves (EIIS Identifier SB - RV) until control power was restored to the SBCS.

The 4.16 KV 'B' safety bus was restored to its normal off-site power supply at 0805 and EDG 'B' was secured. This event is reportable as an automatic reactor protection system actuation.

The root cause of this event was the severe grid voltage transient on the Louisiana Power and Light (LP&L) Company 230 KV system caused by Occidental Chemical Company. An investigation was conducted to determine why the 'B' safety bus tripped on undervoltage and transferred to EDG 'B'. The 'AB' safety bus was aligned to the 'B' safety bus at the time of the initial event. It was concluded that 4.16 KV 'B' safety bus voltage probably dropped lower than the 'A' bus because of the additional loads on the 'B' bus as compared to the 'A' bus. Therefore, when the fault occurred, the voltage levels fell within the undervoltage relay operating limits and tolerances for the 'B' safety bus but not for 'A'. After review of calibration data for the undervoltage relays of the 'A' and 'B' safety buses, it was determined that these relays performed as designed and within calibration tolerances.

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The grid faults were cleared by actuation of the backup protection relays of the industrial loop that supplies power to the chemical company resulting in a fault clearing time of approximately .5 seconds. Although the consequences of a shorter duration fault on the 230 KV system are not known, the voltage transient may have been less severe if the primary relay system at the chemical company's substation had been in service. LP&L is investigating the protective relay performance of the industrial

loop and their maintenance reporting procedures. Appropriate corrective action will be carried out based on causal information.

Because plant protective features functioned as designed, this event did not threaten the health or safety of the general public or plant personnel.

Similar Events

None

Plant Contact

T. H. Smith, Plant Engineering Superintendent, 504-464-3127.

ATTACHMENT 1 TO 9010240411 PAGE 1 OF 1

Entergy Entergy Operations, Inc.  
Operations P. O. Box B  
Killona, LA 70066  
Tel. 504-739-6650

Ref: 10CFR50.73 (a) (2) (iv)

W3A90-0407  
A4.05  
QA

October 11, 1990

U. S. Nuclear Regulatory Commission  
ATTENTION: Document Control Desk  
Washington, D. C. 20555

Subject: Waterford 3 SES  
Docket No. 50-382  
License No. NPF-38  
Reporting of Licensee Event Report

Gentlemen:

Attached is Licensee Event Report Number LER-90-003-01 for Waterford Steam Electric Station Unit 3. This Licensee Event Report supplement is submitted for potential generic interest with respect to off-site grid conditions.

Very truly yours,

J. R. McGaha  
General Manager - Plant Operations

JRM/JEF/rk  
Attachment

cc: Messrs. R. D. Martin  
J. T. Wheelock - INPO Records Center  
E. L. Blake  
W. M. Stevenson  
D. L. Wigginton  
NRC Resident Inspectors Office

\*\*\* END OF DOCUMENT \*\*\*

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